

Conference Paper

Verbal Memory in Late-life Depressions and Normal Ageing

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Abstract

In the present article, authors analyze characteristics of verbal memory in late-life depressions and normal ageing. During last decades, the increase of frequency of affective disorders in depression spectrum in late age attracts attention of specialists. Memory is one of the most sensitive functions in late-life depressions. The main goal of this research is to estimate verbal memory of senior patients with depression and normal persons. Two groups of participants, consisting of 197 patients with depressions of Scientific Center of Mental Health (Moscow) and 100 mentally healthy people participated in this research. Control and clinical groups were comparable by socio-demographical parameters. The results of two methods were interpreted: (1) memorization and delayed reproduction of five words; (2) naming of five sharp objects. In first method, the volume of first reproduction (FR), the number of material presentations required for memorization (N) and the volume of delayed reproduction (DR) were examined. In addition, the frequency of occurrence of various types of errors such as omissions, inert repetitions, impairments of order and of selectivity was estimated. In the second method were examined: presence of pauses, necessity of psychological assistance, such as verbal stimulation or clarification of the semantic field. Statistical analysis was made using SPSS Statistics and Microsoft office Excel 2007. The research results showed that patients with depression deal with offered methods worse than mentally healthy people do. In memorization of five words, volumes of FR and DR were lower and patients needed more repetitions to memorize. When analyzing age dynamic, negative changes in verbal memory were more evident in clinical group. When naming of five sharp objects, patients with depression made more pauses and needed more frequently clarification of semantic field or verbal stimulation.

Keywords: verbal memory, normal ageing, late-life depressions, neuropsychology

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1. Introduction

Lately due to the increase of the number of senior people in population and frequency of affective depression spectrum disorders, different changes of cognitive functioning in normal and pathological ageing attract attention of scientists [1–2]. Contemporary researches focus not only on new pharmacological treatments of late-life depressions, but on analyzing vulnerable links of cognitive processes with the aim to find ways of psychological optimization and correction. Russian and foreign researchers discovered that senior patients show changes in perception of time and reduction of regulation functions (particularly, in motivational support of cognitive functions), attention and others [2–4].

Memory is one of the most vulnerable parts of cognitive sphere in late-life depressions [5]. The difference between changes in memory processes during normal ageing and late depressions remains an important issue. The problem is that in late ontogenesis memory (and some other cognitive functions) is characterized by many individual differences. These differences are determined by lots of factors, such as previous experience, conditions of physical and mental health, emotional sphere, conditions of individual's memory in youth, formation of compensatory and mediating strategies of memorization and remembering.

Unfortunately, most research of memory in late-life depressions is conducted on a small number of participants, so it can be complicated to obtain reliable data on memory changes during ageing. This was one of the reasons why authors of the present research decided to examine memory in more numerous groups of patients with late-life depression and compare it with memory in normal ageing.

2. Methodology

In present research voluntary participated 297 people; their age varied from 50 to 89. All the participants were divided into two big groups consisting of 100 mentally healthy people (control group) and 197 patients with diagnosis of late-life depression (clinical group). In the clinical group the main diagnosis were F.31, F.32, F.33, F.34 by International classification of diseases –10; the majority of patients had moderate level of depression. Clinical and control groups were comparable by main socio-demographical characteristics (number of male and female participants, educational level, social status, etc.).

Analysis of verbal memory was made on base of 2 methods widely used in Luria's neuropsychological examination: (1) memorization and delayed reproduction of 5 words (auditory presentation); (2) naming of 5 sharp objects [6].

The first method was applied to examine the following characteristics:

- (1) the volume of first reproduction (FR);
- (2) the number of material presentations required for memorization (N);
- (3) the volume of delayed reproduction (DR).

In addition, the frequency of occurrence of various types of errors was estimated: omissions, inert repetitions, impairments of order and of selectivity.

The second method was applied to examine the following characteristics:

- (1) the presence of pauses;
- (2) the necessity of psychological assistance such as verbal stimulation or clarification of the semantic field.

SPSS Statistics and Microsoft office Excel 2007 were used for data processing. For data in paired subgroups of comparison (male/female, working/retired, etc.) average comparing analysis – Student T-criteria for independent samples were used. To calculate statistical significance where the number of subgroups was more than two (by age, MRI and diagnosis of neuropsychologist and psychiatrist), a single-factor dispersion analysis was used.

3. Results

According to the obtained results, the control group dealt with offered methods better than clinical group. In memorization and delayed reproduction of 5 words, statistically significant differences were noticed in speed of memorization ($p < 0.05$). Moreover, 22% of patients with late-life depressions were not able to learn 5 words even after maximal number of repetitions (more than 4), while in the control group such cases were not observed. In addition, statistically significant differences were found between subgroups by education level, social status and age. In stage of FR participants with high education showed better results than participants with lower levels of education; they learned 5 words faster. Participants who were still working also needed less number of repetitions of words for memorization and their volume of DR was much higher than of retired participants.

Analysis of results showed that volume of FR was gradually decreasing with the age; the same changes were noticed in speed of memorization and volume of DR, but they were nonlinear. Participants aged 50–59 showed worse results than participants aged 60–69, after which age memory is decreasing with ageing.

Similar tendencies were observed in results of clinical group. Better results in FR stage showed people with higher education, they reproduced significantly more correct words on DR stage. Employed participants showed better results in all stages. In clinical group differences between subgroups by manual preferences were found: righthanded people reproduced more correct words on FR stage than lefthanded and ambidexters persons. Was observed that the volume of FR decreases with the age and the speed of memorization is slowing. On DR stage changes were non-gradual, but anyway participants from subgroup over 80 had worst results.

According to psychiatric diagnosis, there were no significant differences in the results of 5 words memorization, except one exclusion: patients with recurrent depressive disorder (RDD) showed smaller volume of FR in comparison with patients with depressive episode (DE).

In subgroups by MRI-scanning participants without brain pathology best results showed. Significant differences of this subgroup in FR volume were noticed between subgroups with external and/or internal hydrocephaly and vascular genesis small zones in the brain. People with combination of vascular zones and hydrocephaly showed worst results in memorizing 5 words on all stages of method. Also, in comparison with patients with hydrocephaly, patients with vascular genesis small zones were better in memorizing 5 words in every stage, some of these differences were statistically significant.

According to results of complex neuropsychological examination we came to the conclusion that more extensive brain dysfunction causes bigger disorder in memory function. Better results were shown by patients with dysfunction of subcortical structures, worst results – patients with dysfunction of subcortical structures, posterior and anterior parts of the brain (Table 1).

Analysis of frequency of different types of errors in memorizing 5 words showed that patients with late age depressions significantly more often made mistakes like impairments of order, impairments of selectivity and inert repetitions. Omissions were also more common among clinical group, but these differences did not reach statistical significance.

Results obtained in method of naming of 5 sharp objects are consistent with results of memorizing 5 words in many aspects. In control group there with no statistically

TABLE 1: Main characteristics of FR, N, DR of 5 words memorization in patients with different psychiatric diagnosis, MRI-scanning results and results of complex neuropsychological examination.

Subgroups of Comparison	FR Volume	Number of repetitions needed for memorization (N)	DR Volume
Psychiatric diagnosis			
RDD	4.29* (3.38)	2.69	4.29 (3.07)
BAD	4.3 (3.43)	2.6	4.34 (3.6)
DE	4.625* (3.58)	2.25	4.58 (3.38)
Other types of depression	4.4 (3.55)	2.44	4.23 (3.61)
MRI-scanning data			
External and/or internal hydrocephaly	4.34 (3.34*)	2.59	4.3* (3.45)
Vascular genesis small zones	4.375 (3.625*)	2.625	4.5 (4.125*)
Combination of vascular genesis small zones and hydrocephaly	4.36 (3.36*)	2.75*	4.15* (3.03*)
Without pathology	4.625 (4.5*)	1.85*	4.875* (4)
Results of complex neuropsychological examination			
Dysfunction of subcortical structures	4.56* (3.68)	2.19*	4.56* (3.83*)
Dysfunction of subcortical structures and posterior parts of the brain	4.38* (3)	2.88*	4.23* (3.5*)
Dysfunction of subcortical structures and anterior parts of the brain	4.17* (3.23)	2.87*	4.2* (3*)
Dysfunction of subcortical structures, posterior and anterior parts of the brain	4.25* (3.34)	3.17*	3.74* (2.37*)
Notes: Numbers before brackets mean the volume of FR or DR, numbers in brackets – the number of correctly reproduced words at FR and DR stages, in average for the relevant subgroup; * – statistically significant differences. FR – the volume of first reproduction; N – the number of presentations of material required for memorization; DR – the volume of delayed reproduction.			

significant differences in subgroups by sex, educational level and manual preferences. Participants who were still working needed less clarification of semantic field.

Analysis of age dynamics showed that with ageing necessity of clarification of semantic field is growing, but the growth is not lineal.

In clinical group some significant differences were found. 60% of men showed no difficulties in this method, in comparison with only 43% of women. Men were making significantly less number of pauses. Participants with higher education were also making significantly less pauses. Working participants were better in every rate of method.

In age dynamics gradual increase of pauses was noticed. Significant differences were found in necessity of verbal stimulation, but they were not lineal.

Patients in subgroups by MRI-scanning needed different types of psychological help. Patients with hydrocephaly or combination of hydrocephalus and vascular zones needed more verbal stimulation. Only participants without visible pathology on MRI did not need clarification of semantic field.

According to complex neuropsychological examination findings patients with the widest cerebral dysfunction showed worst results. Only 22% of them made no mistakes in naming 5 sharp objects. In comparison 63% patients with dysfunction of subcortical structures succeed in this method. Significant differences between these subgroups in number of pauses and clarification of semantic field were found.

4. Discussion

The present research was conducted in order to find differences between work of memory during normal and pathological ageing (on example of late-life depressions) and to find mechanisms of these dysfunctions.

The research showed that the speed of memorization in normal ageing is faster, it can be because during pathological ageing mental processes including memory are slowing more than during normal [7].

Moreover, during ageing early stages of memorization suffer more; the confirmation can be found in present research: in both clinical and control group rates of FR were decreasing gradually, which was opposite for rates of DR.

This fact shows that DR quality may depend on efficiency of compensatory mechanisms and on different conditions of memory provided by right and left hemispheres. It is common knowledge that for many types of memory right hemisphere is main for FR and left – for DR.

In subgroups by gender there were no significant differences in memorization of 5 words, but they were noticed in naming of 5 sharp objects, where men were better than women. Possibly, women with affective disorders have more problems with actualization of past experience.

Participants with higher education showed better results in both clinical and control groups. In control group they showed faster speed of memorization; in clinical group their volume of DR was bigger. The number of pauses during interferential task was smaller. Apparently, memory training during life forms and trains memory function in the way that memory is still functioning effectively even in the conditions of pathological ageing.

Comparing subgroups by social status it is possible to conclude that retiring has a negative impact on memory function. At the same time, there is a possibility that in some cases bad conditions of memory can be the cause of retirement. In control group retired participants showed slower speed of memorization and significantly smaller volume of DR. These differences were even more notable in clinical group, where working participants were better on every stage of method. During naming 5 sharp objects retired patients needed frequently clarification of semantic field, when working participants did not need help. During work, people must learn something new and gain new skills, these activities are the base to form new neuronal nets in the brain. Retired people do not need to learn something new constantly, so this may be the reason why memory decreases [8].

Was noticed, that lefthanded participants and ambidexters had smaller volume of correct words in FR. Apparently, ageing has more impact on right hemisphere and it is more vulnerable in late-life depressions; that is why memory decrease can be more tangible on lefthanded and ambidexters.

In control group participants from 50 to 59 were memorizing 5 words slower than from 60 to 69. It may be because the period from 50 to 59 is the period of changes in social situation, adaptation and development of compensatory mechanisms. Organism resources are directed to biosocial reorganization and not to cognitive functioning. From 60 to 69 reorganization finishes and compensatory mechanisms work on support of cognitive function; results of methods become better. Interesting fact is that in clinical group memory decreases gradually and there were participants who could not memorize 5 words. The conclusion that can be made is that during late depressions there are problems with formation of compensatory mechanisms, what has an impact on verbal memory.

In subgroups by psychiatric diagnosis notable difference was only between participants with RDD and DE. This data corresponds to specificity of time perception in late-life depressions [9].

In subgroups by MRI-scanning: participants with some vascular changes showed better results than other subgroups with visible pathology. Vascular changes impact less on memory function, may be, because they are not accompanied by marked decrease in brain mass, the expansion of subarachnoid spaces and cerebral ventricles, as in the case of hydrocephaly. According to this research vascular changes are progressing slowly, and compensatory potential is high. In naming 5 sharp objects participants of this subgroup needed less verbal stimulation. Better results showed only subgroup without pathology on MRI, they did not need clarification of semantic

field. This data shows, that late-life depression together with changes on MRI causes difficulties with actualization of verbal information.

Participants with wider brain dysfunction showed worst characteristics of verbal memory, most of all in speed of memorization and volume of correct words in DR. In naming of 5 sharp objects they were making biggest number of pauses. It is known that memory is kept by 3 blocks of the brain, so memory dysfunction and problems with usage of compensatory strategies are stronger respectively the extent of brain dysfunction [10].

It should be emphasized that some cognitive deficits cannot be compensated even after emotional stabilization of depression. Moreover, pharmacological therapy can be ineffective because behavioral changes can be caused not only by emotional problems, but by changes of cognitive functions. Together with pharmacological therapy, it is recommended to use neuropsychological methods to maintain memory using intact links and compensatory strategies. They should be based on previous experience of patient. For senior people whose level of involuntary memorization decreases effective methods are: associations, visualization, usage of different modalities to memorize verbal information (rhythms, abbreviation, division into parts) [11].

A program with exercises to transform verbal information into visual stimuli that increases effectiveness of memorization was created in Russia [12]. Modern research also show efficiency of external sources of memorization, such as calendars, stickers, notebooks, environmental organization [11].

5. Conclusion

The research showed that in late-life depressions together with problems of emotional-affective sphere symptoms of decrease of verbal memory are observable [13]. The level of memory deficit can be different and depends on many factors: age, social status, educational level, brain pathology detected by MRI, etc. In some cases, they are similar to dementia deficit. During depression patients have passive and pessimistic estimation of their cognitive resources, decrease of interest for the results of their activity, reduction of regulation and mediational strategies. That is why in most part of cases participants needed help in naming of 5 sharp objects and were making mistakes like contaminations, errors of order, inert repetitions. These mistakes indicate decrease of attention and control of memory function.

In the research was shown that professional activity and high educational level impact on memory processes during normal and pathological ageing. Participants with higher education and with job showed statistically significant better results.

Obtained data helps to find vulnerable links of verbal memory in late depressions; they can be considered as targets for neuropsychological correction.

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